

S/509/60/000/004/015/024  
E111/E152

Chemical Affinity in Solid Solutions of Metallic Alloys

lead to an equation from which possible values of  $m$  and  $n$  in  $Fe_mC_n$  can be found. After rejection of some on theoretical grounds the author deduces two compounds,  $FeC_5$  and  $Fe_{18}C_6$ . The first has some similarity to the diamond structure, which provides some support for the old idea that hardening gives rise to diamond molecules. The compound is also a possibility in martensite crystals and the author recommends its further study. The second compound can be regarded as a polymer of cementite. The author has previously (Ref.6) deduced an energy equation for distortion of a crystal lattice by impurities and compounds in solid solution. On this basis the author obtains curves of the value of the austenitic parameter ( $\bar{A}$ ) against carbon content (wt.%) (Fig.2), which satisfy points again based on published data (Ref.1). He defers allowance for  $FeC_5$  in the treatment until its existence has been further confirmed. On thermodynamic grounds he obtains the equilibrium carbon distribution ratio ( $x$ ) in terms of the concentration of graphite-type  $Fe_{18}C_6$  system and total carbon in austenite:

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$$1 - x = \frac{K_{carb.}}{6 \sqrt{K_{graph.}}} \sqrt[6]{\frac{x}{C_{total}^5}}$$

where K - Boltzmann constant. The relation between temperature and the relative content of graphite compound molecules in austenite for various carbon contents has been calculated by the author (Ref.7) and results are shown in Fig.3. On this basis the author has calculated the Bain S-curve, agreement with experimental data being worse in the bottom part of the curve probably because of the FeC<sub>5</sub> compound. Discussing means of determining compounds in solid solution, the author considers the well-established electrical-resistivity rule of Mathiessen. He has previously studied the relation between the residual resistivity (i.e. the value obtained by extrapolation to absolute zero) and composition for a number of binary alloys (Ref.8) confirming the rule, and also

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# Chemical Affinity in Solid Solutions of Metallic Alloys

providing evidence of compound formation. Some anomalous temperature effects have been obtained: for nickel-copper alloys in the 25-80 atomic % Cu range the inverse of the resistivity temperature coefficient,  $10^6$  °C/ohm cm (curve 2 and R.H. ordinate in Fig.5) is not additive; on the residual resistivity curve ( $10^{-6}$  ohm cm) (curve 1 and L.H. ordinate)  $Ni_4Cu$ ,  $Ni_4Cu_3$  and  $Cu_3Ni$  are indicated (abscissa in atomic concentration of Cu). To check his explanation of the anomaly in terms of how the electron shells are filled, the author studied magnesium-cadmium alloys: the corresponding results are given in Fig.6 (notation the same as in Fig.5, abscissa in atomic Cd concentration). Here too anomalous effects were found at 0.3-0.8 atomic concentration of cadmium (Ref.8). By calculating parameter curves the author has shown that the compounds present are those which influence the space-lattice parameter. He considers next the Hall effect for investigating chemical-compounds in metallic solid solutions. Fig.7 shows the Hall constant (volt.cm/oersted.amp) as a function of atomic % Mo in Ti-Mo alloys: this was studied by the author together with

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V.G. Gromov:  $Ti_4Mo$ ,  $Ti_3Mo$  and  $TiMo_4$  are indicated. For ternary Fe-Co-Ni system  $Fe_3Ni.CoNi$  and  $FeNi_4.CoNi_4$  were previously found by the author (Ref.9). Many of the observed effects can be explained in terms of the quantum theory of the chemical bond. Chemical compounds in solid solution should have corresponding crystalline phases in which they would have crystallized if thermodynamic conditions had been favourable, and this has been observed among systems studied by the author's method. Metallic solid solutions also have joint crystallization of different substances (e.g. in Fe-Cr), rather similar to water-of-crystallization effects. A knowledge of chemical compounds in solid solutions facilitates the choice of heat-treatment conditions. The author considers that the material presented shows that these compounds can already be correctly determined and states that future work will be more concerned with phase changes or dispersion transformations. There are 8 figures and 16 references: 9 Soviet and 7 non-Soviet.

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18.1152

1454, 1496, 1418

S/180/61/000/004/010/020  
E193/E383

AUTHORS: Grum-Grzhimaylo, N.V. and Gromova, V.G.

TITLE: Hardness and electrical resistivity of alloys of the titanium-chromium-molybdenum system

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo. no. 4, 1961, pp. 71 - 75

TEXT: The present investigation was carried out in continuation of the authors' previous work (Ref. 1 - Trudy In-ta metallurgii, No. 5, pub. AS USSR, 1960) whose results indicated that, although all alloys of the Ti-Cr-Mo system solidify as solid solutions with a body-centered cubic lattice, decomposition of these solid solutions takes place at lower temperatures; alloys, adjacent to the 2-phase region of the Ti-Cr system, decompose with the formation of an intermetallic compound  $TiCr_2$ , the decomposition of the alloys, situated in the Ti corner of the ternary diagram, being associated with the polymorphic transformation of titanium. The object of the present work was to determine hardness and electrical resistivity

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of alloys of three vertical sections of the Ti-Cr-Mo system passing through the titanium corner and characterised by Cr:Mo content ratios of 1:4, 1:1 and 4:1. The results are tabulated and reproduced graphically. In Fig. 1, the Vickers hardness ( $H_V$ ,  $\text{kg/mm}^2$ ) is plotted against the combined Cr + Mo content (wt.%), diagrams a, b and c relating to alloys with Cr:Mo ratios of 1:4, 1:1 and 4:1, respectively; experimental points denoted by circles, dots and crosses indicate data obtained on specimens quenched from 1200, 900 and 600 °C, respectively. The composition-dependence of the electrical resistivity ( $\rho \times 10^6$  ohm cm) is illustrated in the same manner in Fig. 2, where dots and crosses relate to data obtained on specimens quenched from 600 and 900 °C, respectively. The results are discussed in relation to the constitution of the alloys studied and it is concluded that, although their electrical resistivity is a function of composition, it depends also on the

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constitution of the alloys, decreasing in the presence of a large proportion of the  $\alpha$ -phase and even more so in the presence of  $\text{TiCr}_2$ .

There are 2 figures, 2 tables and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The English-language reference quoted is: Ref. 2 - R.P. Elliott, B.W. Levinger and R. Rostoker - J. Metals, 1953, November.

SUBMITTED: September 3, 1960

Card 3/5  
3

X

18.7520 1145, 1555, 1454

21753  
S/078/61/006/005/009/015  
B121/B208

AUTHORS: Grum-Grzhimaylo, N. V., Prokof'yev, D. I.

TITLE: X-ray examination of solid solutions of the system chromium - tungsten - molybdenum formed at high temperatures

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 5, 1961, 1155 - 1164

TEXT: Solid solutions of the ternary system chromium-tungsten-molybdenum were X-rayed to study the effect of the concentration of the components on the lattice parameters. The preparation of chromium-tungsten-molybdenum alloys has already been described by N. V. Grum-Grzhimaylo and D. I. Prokof'yev (Ref. 1: Zh. neorgan. khimii, 3, 1220 (1958)). The composition of the alloys along the cuts with constant content of one of the components is presented in a table. In the X-ray analysis negatives were taken with the KPOC-1 (KROS-1) camera. The parameters were determined with an accuracy of  $\pm 0.004$  kX. Solid ternary solutions were found to be formed at elevated temperatures in the system chromium-tungsten-molybdenum. When these alloys are annealed, the solid solutions decompose. The linear

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X

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dependence of the lattice parameters of ternary alloys was calculated for different mixing ratios and summarized in the above-mentioned table. With increasing chromium content in the alloys the lattice parameter evenly decreases, and the curvature of the isoparameter is changed. The chromium atom causes a dilation of the lattices deviating from the Vegart rule in the binary solid solutions of the systems chromium-tungsten and chromium-molybdenum. A maximum diminution of the crystal lattices occurs in alloys with 50 and more atom% Cr. With increasing chromium content the lattice parameters of the ternary alloys slowly decrease. Molybdenum and tungsten also change the lattice parameters; in the ternary solid solution this change depends linearly on the composition. The mutual solubility in solid state, experimentally found by X-ray and microscopic examination of the alloys of the ternary system chromium-tungsten-molybdenum, confirmed the assumption of I. I. Kornilov (Ref. 12: Dokl. AN SSSR, 114, No. 1 (1957)) saying that these three metals form continuous series of solid solutions, both as ternary and also as binary systems. L. N. Guseva is thanked for her interest in the experiments and in the discussion of the results. The following papers by Soviet authors are mentioned: Ref. 7: V. G. Kuznetsov, Izv. Sektora platiny AN SSSR, vyp. 20 (1947); Ref. 9: V. G. Kuz-

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X-ray examination of solid ...

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netsov, Izv. Sektora fiz.-khim. analiza AN SSSR, 16 (1946); 16 (1948);  
Ref. 10: V. G. Kuznetsov, L. N. Guseva, Izv. AN SSSR, ser. khim., no. 6,  
905 (1940); Ref. 11: V. G. Kuznetsov, Ye. S. Makarov, Izv. Sektora  
fiz.-khim. analiza, 13, 177 (1940). There are 14 figures, 1 table, and  
12 references: 6 Soviet-bloc and 6 non-Soviet-bloc. The references to  
English-language publications read as follows: Ref. 5: H.T. Greenaway,  
J. Inst. Metals, 80, 589 (1952); Ref. 6: W. B. Pearson, Handb. of lattice  
spacings and structures of metals and alloys 1958; Ref. 8: A. G. Andersen,  
E. R. Jette, Trans. ASM, 24, 519 (1936).

SUBMITTED: April 22, 1960

Table: Lattice parameters of the alloys of the solid solution of the  
system chromium-tungsten-molybdenum. Legend: (a) Composition of the  
alloy; (1) wt%, (2) atom%; (b) lattice parameter, kX; (3) found;  
(4) calculated; (5) difference.

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18.1285

also 1555

21568

S/020/61/137/003/018/030  
B103/B208

AUTHORS: Grum-Grzhimaylo, N. V., Kornilov, I. I., Pylayeva, Ye. N.,  
and Volkova, M. A.

TITLE: Metallic compounds in the range of solid  $\alpha$ -solutions of  
the system titanium-aluminum

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 3, 1961, 599-602

TEXT: The authors proved (Ref. 6: Tr. inst. metallurgii AN SSSR, no. 2, 1957) that in titanium - aluminum alloys (7.5-20 wt% Al) the resistance to creeping in bending deformation by the centrifugal method rapidly increases as plasticity decreases. They point out that such a change of properties in the range of solid solutions of the binary system Ti - Al could not be explained by conventional methods of metallographic analysis. X

The objectives of the present study were therefore the following:

- 1) investigation of the range of solid  $\alpha$ -solution in the Ti - Al system;
- 2) determination of the nature of phases appearing in it by measuring the Hall effect as a function of the composition of the alloys. The authors have previously proved (Ref. 9: ZhNKh, 2, no. 10, 1957; Ref. 10: ibid,

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31, no. 9, 1956) that the galvanomagnetic effects are related to the composition of various alloys in a way that salient points and jumps appear in the diagram composition-versus-Hall effect. This phenomenon can be explained by the fact that the electron states in the outer atomic shells are changed by applying a magnetic field. This affects the behavior of conduction electrons and alters the values of the Hall constant. The galvanomagnetic effects are closely related to the behavior of the electron components of the outer atomic shells. The state of the outer shell may be studied with high accuracy on the basis of these effects. The character of the chemical bond between various atoms of metallic alloys may thus be explained. The authors prepared alloys from pure titanium and aluminum with an Al content up to 40 wt% by two methods: 1) powder metallurgy by pressing and sintering in vacuo at 600-1000°C for 50-100 hr. 2) melting in the arc furnace with a wear-resistant tungsten electrode. The current collectors were triangular and knife-shaped at the point of contact with the specimen. They glided along the polished lateral faces of the sample by means of micrometer screws. Test method and measuring apparatus are described in Ref. 11 (N. V. Grum-Grzhimaylo, ZhNKh, 3, no. 7, 1958). Table 1 contains the resultant mean

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values of the Hall constant of the alloys. On the basis of these data, the authors plotted a diagram of this constant as a function of the composition (Fig. 1). Two (a and b) jumps from the linear variation of the Hall constant to another linear variation are seen. These jumps correspond to: a) the compound  $Ti_6Al$  with 14.3 atom% (9 wt%) of aluminum; b) the compound  $Ti_3Al$  with 25 atom% (16 wt%) Al. The sintered and the cast alloys showed the same behavior. The cast alloys were subjected to homogenizing heat treatment (between 600 and 900°C for 200-350 hr) immediately after measuring the Hall constant. The limited range of the solid  $\alpha$ -solution offers considerable difficulties in the presence of two metallic compounds if the order of variations of the Hall constant has to be determined. This determination requires an increased precision of measurement which was achieved by the device applied here. The authors conclude from their data that the solid aluminum solutions in  $\alpha$ -titanium exhibit a complicated kind of interaction owing to the existence of the two compounds  $Ti_6Al$  and  $Ti_3Al$  which apparently have a hexagonal lattice. X

They might result from solid solutions and correspond to compounds of the Kurnakov type (Ref. 12: I. I. Kornilov, Izv. AN SSSR, OKhN, 1957,

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no, 4,.395). The diagrams of the Hall constant in the range of the  $\gamma$ -phase in alloys with 46.16 atom% (33wt%) to 53.85 atom% (40.0 wt%) aluminum show a sharp discontinuity at 50.0 atom% (36.02 wt%) aluminum. It corresponds to the compound  $TiAl$  which was detected by other methods of physicochemical analysis. The equilibrium of the compounds  $Ti_6Al$ ,  $Ti_3Al$ ,  $TiAl$  and the proof of their existence in the phase diagram depend on the kinetics and on the conditions of their formation which have to be further studied. The appearance of these compounds in the system Ti - Al increases the heat resistance of the alloys and rapidly decreases their plasticity at an aluminum content of more than 7-8 wt%. There are 1 figure, 1 table, and 12 references: 8 Soviet-bloc and 4 non-Soviet-bloc. The reference to the English-language publication reads as follows: M. Hansen, Constitution of binary alloys, N.Y. London, 1958, p. 139 (Ref. 1).

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR  
(Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

Card 4/8

OSIPOV, Kirill Afanas'yevich; GRUM-GRZHIMAYLO, N.V., doktor khim. nauk,  
otv. red.

[Certain activated processes in hard metals and alloys] Nekotorye  
aktiviruemye protsessy v tverdykh metallakh i splavakh. Moskva,  
Izd-vo Akad. nauk SSSR, 1962. 130 p. (MIRA 16:1)  
(Metallography) (Activity coefficients)

S/598/62/000/007/017/040  
D290/D307

AUTHORS: Grum-Grzhimaylo, N. V. and Gromova, V. G.

TITLE: Some mechanical properties of ternary alloys of titanium with chromium and molybdenum

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Titan i yego splavy, no. 7, Moscow, 1962. Metallokhimiya i novyye splavy, 127-129

TEXT: The strengths and plasticities of six hardened Ti-Cr-Mo alloys were measured; the weight percent of each metal varied between 76 - 96% Ti, 0.8 - 19.2% Cr and 0.8 - 16% Mo. The present work continues an earlier study of the mechanical properties of Ti-Cr-Mo alloys by the same authors. The measurements were made by a micro-mechanical method. The alloy with optimum properties at room temperature ( $\sigma_B = 94.4 \text{ kg/mm}^2$ ,  $\delta = 23.1\%$ ) contained 96% Ti, 2% Cr and 2% Mo; it is a mixture of  $\alpha$ - and  $\beta$ -phases. [Abstracter's note:  $\sigma_B$ ,  $\delta$  not defined.] The results are confirmed by work on the re-

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Some mechanical properties ...

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commended industrial Ti alloy BT3-1 (VT3-1) which contains 1.5 - 2.5% Cr and 1.0 - 2.8% Mo as well as Al. There are 3 figures and 2 tables.

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1966

S/078/62/007/003/009/  
B110/B138

12.1200

AUTHORS: Grum-Grzhimaylo, N. V., Prokof'yev, D. I.  
TITLE: Polythermal disintegration volume of the ternary solid solution in the Cr-W-Mo system  
PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 3, 1962, 596-604

TEXT: Ternary alloys of the Cr-W-Mo system were examined, and the disintegration volume of the  $\alpha$ -ternary solid solution was determined. The initial curves of the lattice parameters of the solid solution are available from the parametric surface of the homogeneous ternary solid solution. From measured lattice parameters, the composition/lattice parameter curves were plotted for three groups of sections: (1) Alloys with constant (10, 20, 30%) Mo content. From these diagrams the points of intersection of the lines of the  $\alpha_1$  (Cr-rich) and the  $\alpha_2$  (W-rich) phases with those of the homogeneous  $\alpha$ -ternary solid solution were found, and thus the homogeneity boundary of the ternary solid solution. (2) Alloys with constant Cr, and, (3), W content. These diagrams revealed the critical point on the binodal curve of the isothermal section and the critical line on the surface of the  
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Polythermal disintegration volume...

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disintegration volume of the solid solution. In sections with constant (50, 30, 20%) Cr content the parameter lines of the  $\alpha_1$  phase intersect that of the  $\alpha$  solid solution, and consequently, these sections pass through the binodal curve of the isothermal sections to the left and at 10% Cr to the right of the critical point. In the constant W section (40, 50, 60%) the parameter lines of the  $\alpha_1$  and the  $\alpha_2$  phases intersect the parameter curve of the  $\alpha$ -ternary solid solution in one point (at 40% W), from which the critical point on the binode is found, 1000°C. The boundary of the two-phase range of disintegration can be found on the isothermal sections for 1000, 1300, and 1600°C (Fig. 5). As the disintegration volume varies considerably with temperature ageing possibilities can be determined. The dissociation binode at 1600°C, bounding the two-phase alloy range is a continuous closed curve, and must therefore have two critical points. Dissociation temperature of the  $\alpha$ -homogeneous solid solution rises on Mo addition to the binary Cr-W alloy. This ternary critical point is above the binary critical point of the Cr-W dissociation range binode. A critical points exists on the 1000 and 1300°C binodes. The isoparametric method was used to determine the position of conoids (Fig. 6) in the two-

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Polythermal disintegration volume...

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phase range of isothermal sections. The isoparametric curves of the homogeneous  $\alpha$ -ternary solid solution and the solubility curves at 1000 and 1300°C show the variation in lattice parameters along the binodal. For a number of alloys the 1000°C conoids show a divergence. Analysis revealed a third phase  $\alpha_x$ , with body-centered cubic lattice which may be the cause of the unstable disintegration curves. The dome-shaped binodal surface of the disintegration volume with ternary critical point is clearly illustrated in Fig. 8. It closes inside the temperature-concentration prism separating the closed disintegration volume of the ternary solid solution. The asymmetry is probably due to the deformation energy of the crystal lattice as a result of the difference in atomic diameters and the elastic properties of Cr, W, and Mo. The ternary critical point K is shifted toward the elastic W and Mo. Since the Cr-W-Mo systems formed by Mo addition to binary Cr-W systems and having a deformed crystal lattice are in the energetic stressed state, dissociation into two conjugate phases with the same crystal lattice causes greater thermodynamic stability and eliminates the stresses. V. G. Kuznetsov, Izv. Sektora fiz-khim. analiza, 16, 232 (1946), B. Ya. Pines. Zh. neorgan. khimii, 3, 611 (1958) are mentioned. There are 8 figures, 1 table, and 12 references: 8 Soviet and 4 non-Soviet. The two

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Translation from: Referativnyy zhurnal, Geologiya, 15-57-12-17216  
p 70 (USSR) 1957, Nr 12,

AUTHOR: Grum-Grzhimaylo, O. S.

TITLE: An Occurrence of Microclinization in Granitoidal  
Rocks in Taimyr (Yavleniya mikroklinizatsii v  
granitoidakh Taymyra)

PERIODICAL: Tr. Vses. aero-geol. tresta, 1956, Nr 2, pp 183-189

ABSTRACT: Potassium metasomatism has been noted in Precambrian  
granitoidal rocks in Taimyr for the first time. The  
author describes an intrusive of batholithic type with  
an area of approximately 1000 km<sup>2</sup> which occurs in  
chlorite schists and metamorphosed sandstones of  
Proterozoic age. The schists and sandstones are  
squeezed into steep folds trending northeasterly. The  
intrusive is elongated in the same direction, and is  
divided into three isolated parts. The northern part

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An Occurrence of Microclinization (Cont.)

15-57-12-17216

is composed of uniform quartz diorites and granodiorites. The eastern and southern parts are formed of granitoidal rocks, among which are described microdiorites, quartz diorites, granodiorites, leucocratic granites, aplites, quartz porphyries, dacites, feldspar gneisses, and migmatites. The gneisses and migmatites were formed by potassium metasomatism in the final stages of formation of the intrusive. These are melanocratic rocks with insets of microcline, oriented in the direction of the foliation of the principal mass. After shearing of the rock, the inset minerals also acquired an irregular orientation. The potassium metasomatism produced microcline by replacement of plagioclase and quartz in the granitoidal rocks. Large potassium feldspar minerals were formed (up to 8 cm across); these show no relationship to the chemical analyses. According to the analyses, the primary melt was not enriched in  $K_2O$ . The feldspathic rocks do not form dikes, but grade by degrees into the rocks of the substratum. The mass has a complex petrographic composition, but the gradual transitions between varieties indicates

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An Occurrence of Microclinization (Cont.)

15-57-12-17216

a single body of intrusive magma. The deeper part of the mass is exposed on the north. On the east and south, the gently sloping roof is exposed, with the appearance of migmatization, feldspathization, and dike derivatives characteristic of this zone. The notion of a break in time between the formation of the granitoidal rocks and the development of the microcline rocks is confirmed by studying the zones of cataclasis in the early regional zone and in the late zone along the trend line of the mass. The microcline insets are noticeably deformed only in the young tectonic zones. It is possible that the source of  $K_2O$  for microclinization was the stocks of alkalic rocks situated in the vicinity and breaking through similar granitoidal rocks.

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V. N. Dubrovskiy

GRUM-GRZHIMAYLO, O.S.

Formation of two synclinal folds in the northwestern Kara-Tau  
(southern Kazakhstan). Izv.vys.ucheb.zav.; geol.1 rasv. 2  
no.3:46-53 Mr '59. (MIRA 12:12)

1. Moskovskiy geologorazvedochnyy institut im. S.Ordshonikidze.  
(Kara-Tau (Kazakhstan)--Folds(Geology))



GRUM-GRZHIMAYLO, O.S.

Modeling block folds of the Kara-Tau Range (southern Kazakhstan).  
Trudy MGRI 39:22-27 '63. (MIRA 16:10)

GRUM-GRZHIMAYLO, C.S.

Practice in determining the speed of the growth of recent tectonic folding in the Karatau region (southern Kazakhstan). Izv.vys.ucheb. zav.; geol. i razv. 6 no.5:83-85 My '63.

(MIRA 18:4)

1. Moskovskiy geologorazvedochnyy institut imeni Ordzhonikidze.

GRUM-GRZHIMAYLO, O.S.; LARTSEV, V.S.

Practice in the analytic study of one type of tectonic experiment.

Izv. vys. ucheb. zav.; geol. i razv. 7 no.2:13-21 F'64.

(MIRA 17:2)

1. Moskovskiy geologorazvedochnyy institut im. S. Ordzhonikidze.

GRUM-GRZHEBAYLO, G.S.

Morphological varieties of thrusts in the Karatau (southern Kazakhstan). Izv. AN SSSR Ser. geol. 30 no.1:95-101 Ja '65  
(MIRA 18:2)

1. Moskovskiy geologorazvedochnyy Institut imeni Ordzhonikidze.

GRUN-GRZHEVALO, SERGEI VLADIMIROVICH

Osnovy vzaimozameniaemosti v mashinostroenii. Moskva, Mashgiz, 1946. 2 v.  
v. 1. 192 p., v. 2. 143 p.

DLC: Unclass.

Principles of interchangeability in mechanical engineering.

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library  
of Congress, 1953.

GRUM-GRZHINA/LD, SERGET VLADIMIROVICH

Vybor dopuskov v mashinostroenii; prakticheskoe rukovodstvo. Moskva, Mashgiz, 1950. 236 p. diags.

Includes bibliographies.

DLC: TJ1167.C77

Selection of tolerances in mechanical engineering; practical manual.

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library of Congress, 1953.

DOLIZHIAL', Vladimir Antonovich, prof.; GRUM-GRZHIMAYLO, S.V., dots., retsen-  
zent; KORABLEVA, P.M., inzh., red.; EL'KIND, V.D., tekhn. red.

[Durability of toothed gears] Prochnost' zubchatykh peredach.  
Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1958.  
129 p. (MIRA 11:10)

(Gearing)

25(2)

PHASE I BOOK EXPLOITATION

SOV/1832

Grum-Grzhimaylo, Sergey Vladimirovich

Raschet i osnovy konstruirovaniya elementov privodov (Design and Fundamentals of Construction of Drive Elements) Moscow, Mashgiz, 1958. 355 p. Errata slip inserted. 9,000 copies printed.

Reviewer: N.I. Kazakov, Engineer; Ed.: S.A. Vasil'yev, Engineer; Tech. Ed.: T.F. Sokolova Managing Ed. for Reference Literature: V.I. Krylov, Engineer.

PURPOSE: This book is intended for engineers, designers, and students of vtuses.

COVERAGE: The book is based on the author's lectures at the Moskovskiy aviatsionnyy institut (Moscow Aviation Institute) and Moscow Power Engineering Institute for the course on machine parts. Problems of design and construction of mechanisms and problems of manufacture and accuracy in assembling are discussed. An analysis of efficient drive systems is presented. Methods of breaking down machines into subassemblies and selection datum methods are described. Methods of calculating forces and of designing drive elements for strength are explained and problems of selection and summation of tolerances are discussed.

~~Card 1/15~~



GRUM-GRZHIMAYLO, S.V.; BRILLIANTOV, N.A.; SVIRIDOVA, R.K.; SUKHANOVA, O.N.

Changes in the absorption spectrum arising when the temperature of some nickel-colored synthetic crystals is lowered. Kristallografiia 5 no.2:288-294 Mr-Apr '60. (MIRA 13:9)

1. Institut kristallografii AN SSSR i Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.  
(Nickel sulfate--Spectra)

24,3300

<sup>39692</sup>  
S/051/62/013/001/014/C19  
E039/E420

AUTHORS: Grum-Grzhimaylo, S.V., Brilliantov, N.A.,  
Sviridova, R.K., Sukhanova, O.N., Kapitonova, M.M.

TITLE: Absorption spectra of iron-coloured beryls at  
temperatures from 290 to 1.7°K

PERIODICAL: Optika i spektroskopiya, v.13, no.1, 1962, 133-134

TEXT: Results obtained by the authors are compared with the  
earlier work of M. Dvir and W. Low (Phys. Rev., 119, 1960, 1587)  
who investigated one sample of blue aquamarine beryl at  
temperatures of 290 and 20°K. Measurements were made on the  
polarization of light in the absorption spectra of six samples of  
iron beryls with different colours: yellow, green-yellow and  
blue at temperatures of 1.7, 4.2, 77 and 290°K. The wide  
absorption band observed at 270°K in the near infrared is  
accounted for by the presence of Fe<sup>2+</sup> ions and the absorption  
band in the ultraviolet with a maximum at about 26780 cm<sup>-1</sup> by the  
presence of Fe<sup>3+</sup> ions. These latter bands in the ultraviolet for  
Card 1/3

S/051/62/013/001/014/019  
E039/E420

Absorption spectra. ...

the iron beryls are not observed in the blue aquamarine. At 77°K very weak narrow absorption bands are observed which become more distinct at 4.2°K. In all samples the extraordinary waves are polarized in the 17190 and 18620  $\text{cm}^{-1}$  bands, particularly in the green-yellow beryl no.209 having a maximum thickness of 6.83 mm. There is also a weak unpolarized band at 21520  $\text{cm}^{-1}$ . The 18620 and 21520 bands are not given in the work of Dvir and Low. In all samples the extraordinary waves are completely polarized in the 26780  $\text{cm}^{-1}$  band. Dvir and Low observed bands at 26500 and 17590  $\text{cm}^{-1}$  which are sufficiently near to the authors' at 26780 and 17190  $\text{cm}^{-1}$ . No further change in the absorption spectra were discovered on reducing the temperature to 1.7°K. The five absorption bands presented by Dvir and Low in their paper were interpreted as due to transitions between levels in  $\text{Fe}^{3+}$  ions, separated in the octahedral crystal field. The bands observed near to those of Dvir and Low are interpreted as:  
band 26780  $\text{cm}^{-1}$  transition in  $\text{Fe}^{3+} 6A_0(d\gamma^3d\gamma^2) \rightarrow 4T_2(d\gamma^3d\gamma^2)$  and the band 17190  $\text{cm}^{-1}$  as the  $6A_0(d\gamma^3d\gamma^2) \rightarrow 4T_2(d\gamma^4d\gamma)$  transition.

Card 2/3

Absorption spectra. ....

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It is assumed that the narrow bands 18620 and 21520  $\text{cm}^{-1}$  not observed by Dvir and Low depend on the presence of  $\text{Fe}^{2+}$  ions. There is 1 figure.

SUBMITTED: August 9, 1961

[Abstracter's note: Abridged translation.]

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Card 3/3

GRUM-GRZHIMAYLO, S.V.

Absorption spectra of minerals containing  $Mn_6^{2+}$ . Zap. Vses. min.  
ob-va 91 no.1:86-89 '62. (MIRA 15:3)  
(Manganese--Spectra)

GRUM-GRZHMAYLO, S.V.; BRILLIANTOV, N.A.; VOLKOVA, N.V.; DOBRYZHANSKIY, G.F.;  
SVIRIDOV, D.T.

Light absorption spectra of nickel ammonium sulfate monocrystals  
at temperature from 290° to 1.7°K. Kristallografiia 7 no.1:  
84-88 Ja-F '62. (MIRA 15:2)

1. Institut kristallografii AN SSSR i Moskovskiy gosudarstvennyy  
universitet im. M.V. Lomonosova.  
(Nickel ammonium sulfate crystals--Spectra)

GRUM-GRZHIMAYLO, S.V.; BRILLIANTOV, N.A.; SVIRIDOVA, R.K.; SUKHANOVA, O.N.;  
KAPITONOVA, M.M.

Absorption spectra of iron-colored beryls at temperatures from  
290 to 1.7 K. Opt.i spektr. 13 no.1:133-134 JI '62.

(Beryl--Spectra)

(MIRA 15:7)

S/051/63/014/002/007/026  
E039/E120

AUTHORS: Grum-Grzhimaylo, S.V., Brilliantov, N.A.,  
Sviridov, D.T., Sviridova, R.K., and Sukhanova, O.N.

TITLE: Absorption spectra of crystals containing  $\text{Fe}^{3+}$  for  
temperatures down to  $1.7^\circ\text{K}$

PERIODICAL: Optika i spektroskopiya, v.14, no.2, 1963, 228-233

TEXT: The absorption spectra of demantoid-garnet  
( $\text{Ca}_3\text{Fe}_2\text{Si}_3\text{O}_{12}$ ), vesuvianite ( $\text{H}_2\text{Ca}_{10}(\text{MgFe})\text{Al}_4\text{Si}_6\text{O}_{18}$ ) and epidote  
( $\text{Ca}_2(\text{AlFe})\text{O}(\text{SiO}_4)[\text{Si}_2\text{O}_7]\text{OH}$ ) are obtained at temperatures of 290,  
77, 4.2 and  $1.7^\circ\text{K}$ . The spectra were obtained in polarized light  
using a  $\text{C}\Phi-4$  (SF-4) spectrograph for observations at  $290^\circ\text{K}$ , and  
quartz  $\text{UC}\Pi-22$  (ISP-22) and glass ISP-51 spectrographs at the lower  
temperatures. In these crystals the color is produced by the  
isomorphous substitution of  $\text{Fe}^{3+}$  ions for  $\text{Al}^{3+}$ . At room temperature  
the absorption spectra of these crystals show wide bands  
characteristic of material containing  $\text{Fe}^{3+}$  ions. At low  
temperatures these bands are narrower. The position of these  
bands for demantoid and epidote is shown in the table.

Card 1/3



Absorption spectra of crystals ...

S/051/63/014/002/007/026  
E039/E120

In the case of vesuvianite three plane parallel plates cut along optical axes were investigated. At room temperature absorption bands with maxima at 23, 520 and 16 100  $\text{cm}^{-1}$  were observed and also a very weak unpolarized band at 21 640  $\text{cm}^{-1}$ . At 4.2 °K the band is slightly displaced. At 1.7 °K the band maximum is at 21 690  $\text{cm}^{-1}$ . These results are compared with the literature and interpreted on the basis of transitions between the ion level and the intracrystalline field.

There are 3 figures and 1 table.

SUBMITTED: August 9, 1962

Card 2/3

Absorption spectra of crystals ...

S/051/63/014/002/007/026  
E039/E120

Position of narrow absorption bands, cm<sup>-1</sup>

Демантоид (Demantoid)

I { 1.7° 4.2 77	22760 (c)* (c) (c)	22970 (cp) (cp) (cp)	23080 (cp) (cp) (cp)	23300 (cl) (cl) (cl)	23550 (o. cl) (o. cl) (o. cl)	23720 (cl) (cl) (o. cl)	23970 (cl) (cl) (cl)	24450 (cp) (cp) (cl)
	25930 (c) (c) (c)	26090 (o. cl) (o. cl) (o. cl)	26270 (cp) (cp) (cl)	26490 (cl) (cl) (o. cl)	26730 (cp) (cp) (cp)	26980 (o. cl) (o. cl) —	27300 (cp) (cp) —	

Эпидот (Epidot)

	band I полоса	band II полоса	band III полоса	band IV полоса (поляризованная ос.) (polarized)
1.7°	21500 (c)	22100 (c)	22620 (o. cl)	23040 (cl)
4.2	21500 (c)	22100 (c)	22620 (o. cl)	23040 (cl)
77	21300 (cp)	22030 (o)	22620 (o. cl)	—
290	21080 (cl) (p)	21950 (cp) (p)	—	—

c - strong, cp - medium, cl - weak, o. cl - very weak,  
p - diffuse.

Card 3/3

GRUM-GREZHIMAYLO, S.V.; RYMSKAYA-KUPSAKOVA, G.M.

Absorption spectra of phlogopites containing trivalent iron  
in fourfold coordination. Dokl. AN SSSR 156 no. 4:847-850  
Je '64. (MIRA 17:6)

1. Institut kristallografii AN SSSR i Leningradskiy  
gosudarstvennyy universitet im. A.A.Zhdanova. Predstavleno  
akademikom V.S.Sobolevym.

YEMEL'YANOVA, Ye.N.; GROM-GROZHMAYLO, S.V.; BORSHA, G.N.; VARINA, T.M.

Synthetic beryls containing V, Mn, Co, and Ni. Kristallografiia  
10 no.1:59-62 Ja-F '65. (MIRA 18:3)

1. Institut kristallografii AN SSSR i Moskovskiy gosudarstvennyy  
universitet imeni Lomonosova.



PROPERTIES AND PROPERTIES INDEX																									
1ST AND 2ND COLUMNS													3RD AND 4TH COLUMNS												
<p>1641. Microscopic Determination of Refractive Index of Mol-                      nous Substances and Highly Refracting Minerals. N. Vedeneva.                      S. Gram-Golitskaya and A. Volkov. <i>Comptes Rendus (Doklady) de                      l'Acad. des Sciences, U.S.S.R.</i> 4. 4-5. pp. 207-210, 1935. In French.—                      The method is a modification of that of Lebedev (see Abstract 817 (1931)),                      using a plano-convex lens, of pyrex or quartz for preparations liquid at                      high temperatures, pressed into the preparation under examination, with                      special care that the horizontal side of the lens is accurately parallel with                      the glass on which the preparation rests. With this arrangement the                      refractive indices for light of <math>\lambda\lambda 4700, 5890, 6778</math> and <math>8400\text{\AA}</math> have been                      determined for a series of numerous preparations consisting of (100-40)                      pigments + <math>4sAs</math> (or <math>Sb</math>)Br, where <math>s = 0 - 21</math>. Results confirm the                      author's previous results, and particularly the change in refraction with                      time. The method is also suitable for molten mixtures of S and Se,                      resins, varnishes, etc. C. A. S.</p>																									
<p>ASTM 5.1.4 METALLURGICAL LITERATURE CLASSIFICATION</p>																									
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Spectro-polarization meter and investigation of mineral dichroism. N. Vedeneva and S. Grum-Grzhimailo. *Compt. rend. acad. sci. U. R. S. S. S.* 3, 583-5(1934).—App. for the measurement of the spectral distribution of dichroism at varying temp. is described. With increasing temp. the max. dichroism of colored tourmaline is decreased and shifted to longer  $\lambda$ . For pink and blue tourmalines the change is irreversible above 425° and 275°, resp. B. C. A.

AND 11.4 METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS																										3RD AND 4TH ORDERS																									
PROCESSES AND PROPERTIES INDEX																																																			
<p><b>Interference method of determining refractive index with a microscope.</b> N. Vedeneva, S. Gerasimov, and A. Volkov. <i>Acta Physicochim. U. R. S. S. S.</i> 3, 391-404 (1930). --Details are given, and the application of the method to the detn. of <math>n</math> of mixts. of As<sub>2</sub>S<sub>3</sub> and Sb<sub>2</sub>S<sub>3</sub> and of S and Se is described. B. C. A.</p>																																																			
<p>AS 6 15.4 METALLURGICAL LITERATURE CLASSIFICATION</p>																																																			

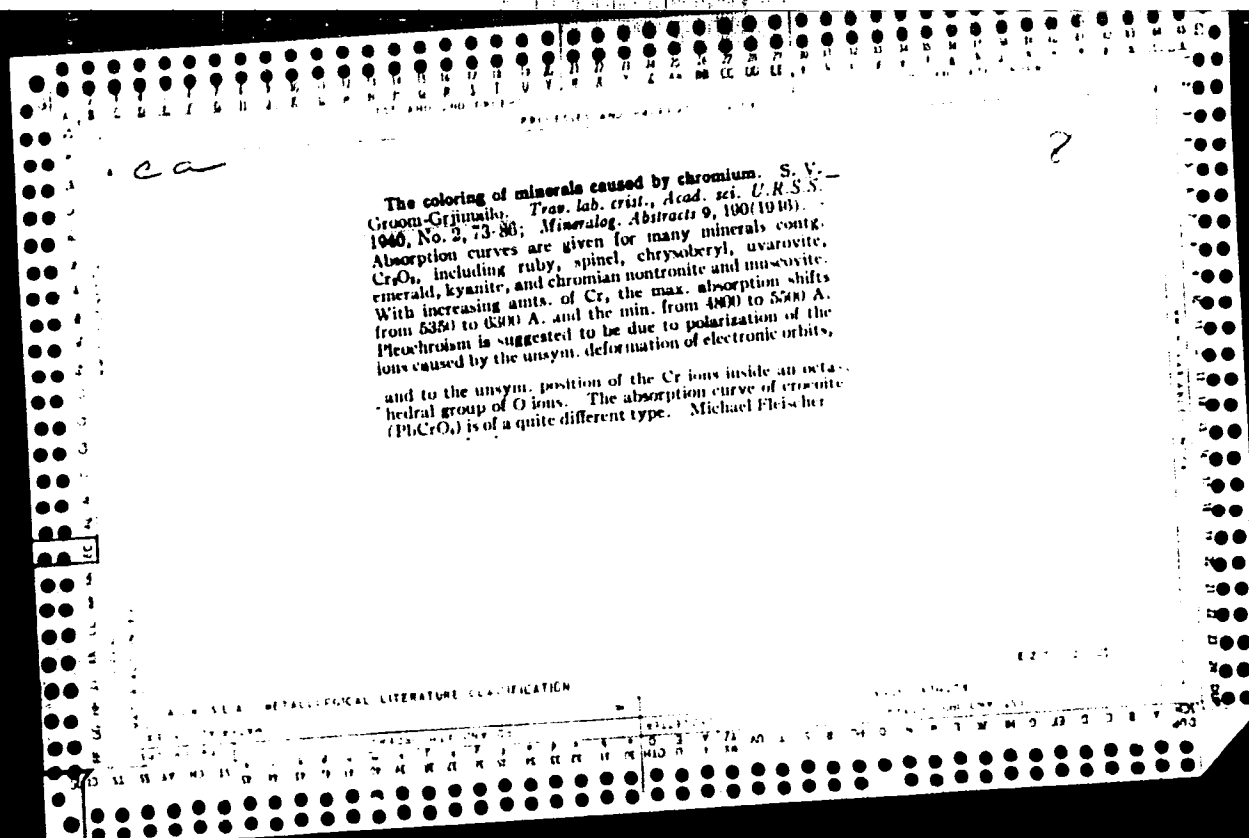


ca 7

(Spectrum) absorption of mineral powders under the microscope. S. V. Gerasimov. *Mineral. Syr.* 11, Nos. 8-9, 41-4 (1956); cf. *Ibid.* 11, No. 1, 22 (1956). The method of identification of minerals by spectrum absorption was applied to detection of rare earths and monazite in black sands. The procedure is described in detail (cf. Wherry, C. A. 24, 1317). Chas. Blanc

ASB-51A DETALLURGICAL LITERATURE CLASSIFICATION

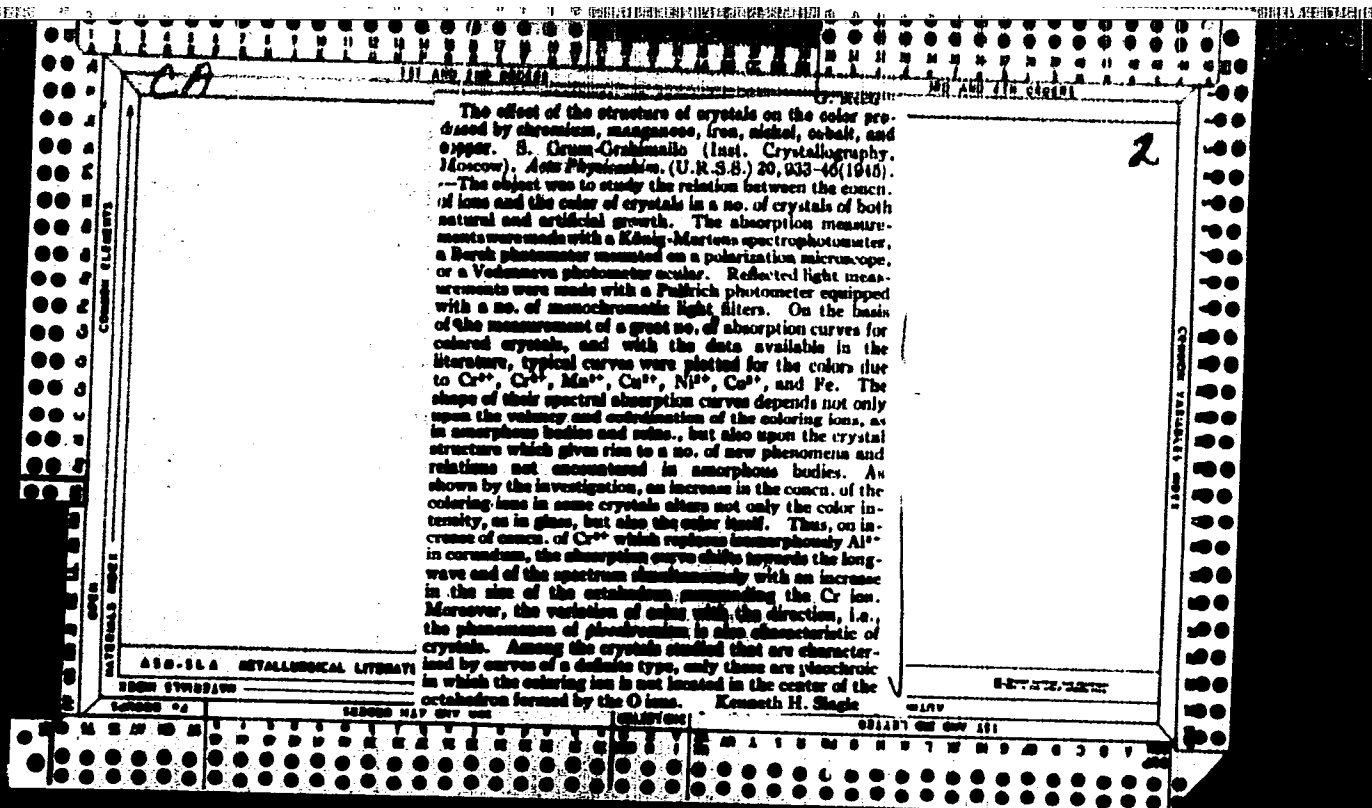
ASB-51A DETALLURGICAL LITERATURE CLASSIFICATION



A.S.C.

*Handwritten signature*

Rapid method for detecting some rare earths. S.V. GUTIN-GAZIMADLO. *Soviet Geol.*, 1940, No. 9, pp. 91-94. *Russian Review*, 2147, 4 [3] 66 (1941).--G. uses a microscope and puts a spectrum ocular in front of the microscope ocular. The spectrum ocular consists of a pocket spectroscope for direct vision. The presence of rare earths is recognized by their characteristic absorption spectra. Polished surfaces and thin sections are viewed in direct light. For viewing grains and small pieces of rock, G. uses a sidelight of the universal lamp of the type VIMS. Pr and Nd give distinct lines in the yellow part of the spectrum between 590 and 570 mμ and in the green part around 525 and 510 mμ. The elements of the Ce group give absorption lines in the yellow part of the spectrum. Negative results are not an indication of the absence of rare earths. Examples are given of the determination of rare earths in apatites and other minerals. This method is not applicable when the concentration of the rare earth is less than 0.00%. M.Ho.



"Alexandrite color" of crystals. S. V. Girun-Grebnitskiy. *Mém. soc. russe mineral.* 75, 253-G(1947); *Chem. Zentr.* 1947, I, 1167.—Alexandrite is transparent to red and to blue-green rays so that the color changes from green in daylight to red in artificial light. This phenomenon is due to the presence of trivalent Cr (0.34%). This also explains the color change in Cr-contg. corundum. The alexandrite color can also be produced by other combinations of ions. M. G. Moore

PROCESSING AND PROPERTY INDEX	
<p><i>CA</i></p> <p><b>Optical testing of ceramic colors.</b> S. V. Gium-Gizbi, malko and A. N. Lyamina. <i>Zhur. Priklad. Khim.</i> (J. Applied Chem.) 21, 1228-41 (1948). Compns. similar to spinels and corundums were tested. Colors having a compn. <math>3\text{MnO} \cdot \text{P}_2\text{O}_5 \cdot 12\text{Al}_2\text{O}_3</math>, fired at <math>1000^\circ</math> were yellow, <math>n</math> of the greater portion was 1.630-1.607, and the spectral absorption curve did not resemble the <math>\text{Mn}^{++}</math> curve; fired at <math>1100^\circ</math>, <math>n</math> was 1.681-1.660, and at <math>1000^\circ</math>, 1.735-1.700 when small anisotropic crystals of corundum were formed and the absorption curve had a max. characteristic of <math>\text{Mn}^{++}</math>. At <math>1100^\circ</math> the crystn. of corundum increased. At <math>1100^\circ</math> the amt. of lamellar corundum was a max. and the absorption curve had a distinct max. Absorption curves of colors of <math>\text{Cr}_2\text{O}_3 \cdot \text{Al}_2\text{O}_3</math> compn. were typical of <math>\text{Cr}^{+++}</math> and had two maxima: one in the visible and another on the border of the infrared. There was a gradual increase of <math>n</math> with increasing <math>\text{Cr}_2\text{O}_3</math>. Mg and Zn spinels, forming solid solns. with spinels in which <math>\text{Al}_2\text{O}_3</math> was replaced by <math>\text{Cr}_2\text{O}_3</math>, were fired at <math>1350^\circ</math> for 30 min. Variation of <math>n</math> from 1.65 to 1.74 indicated nonuniformity. Addn. of <math>5\% \text{B}_2\text{O}_3</math> to samples composed of <math>\text{Cr}_2\text{O}_3 \cdot \text{Al}_2\text{O}_3</math> and fired at <math>1350^\circ</math> for 1 hr. caused a shift of absorption max. toward</p>	<p>the red and a rise of <math>n</math>. Absorption curve of <math>(0.1 \text{CoO} \cdot 0.9 \text{MgO}) \cdot \text{Al}_2\text{O}_3</math> was typical of <math>\text{Co}^{++}</math> in quaternary coordination; <math>n</math> was 1.68-1.73 but with the addn. of <math>\text{B}_2\text{O}_3</math> it was const. at 1.730. Synthetic uvarovite was mixed with sep. oxides and also with a complete glass <math>(0.3 \text{K}_2\text{O} \cdot 0.35 \text{CaO} \cdot 0.35 \text{MgO} \cdot 0.3 \text{Al}_2\text{O}_3 \cdot 4.5 \text{SiO}_2)</math> and fired at <math>1200^\circ</math>. Optical tests showed that <math>\text{K}_2\text{O}</math> as <math>\text{K}_2\text{CO}_3</math>, <math>\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2</math>, destroyed the uvarovite. <math>\text{K}_2\text{O}</math> as <math>\text{K}_2\text{CO}_3</math> retained some of the uvarovite. <math>\text{MgO}</math> acted less destructively, and the complete glass destroyed uvarovite. <math>\text{CaO}</math> favored the formation of uvarovite. <math>\text{B}_2\text{O}_3</math> destroyed the coloration of uvarovite but favored the formation of spinels. 18 references.</p> <p style="text-align: right;">B. Z. Kamich</p>

Crystallo-optical Lab., Inst. Crystallography, AS USSR

and X-Ray Lab., allusion Inst. Mineral. Res. Materials

*Rose color of tourmaline. S. B. Grom-Grzhiniallo. Doklady Akad. Nauk S.S.S.R. 137: 607 (1960).*  
 Rose-colored tourmaline crystals from the Transbaikalian occurrence in the Burshtachetovsk Range were examined. The spectrophotometric measurements were performed in visible, short-wave, infrared, and ultraviolet light, by using a Wollaston prism for the distinction of the absorption in 2 principal directions. No corrections were applied for light losses by reflection on the surfaces of the crystals. All absorption curves show a marked absorption max. in the green, the extinction being more pronounced for the ordinary than for the extraordinary vibration. The coloring principle must be trivalent Mn in the coordination [MnO<sub>6</sub>] (cf. Grom-Grzhiniallo, *Mos. gos. univ. mineral.* 1945, No. 2: 80). The absorption type is in complete agreement with that of a trivalent Mn-contg. glass, for visible and ultraviolet light. In infrared light there is a stronger absorption in tourmaline than in glass, apparently detd. by an Fe<sup>2+</sup> content in the mineral. No explanation is given for a sharp max. of extinction near

$\lambda = 650 \text{ m}\mu$  for a practically colorless crystal. No direct relationship of the Mn content in the rose-colored tourmalines to the intensity of their absorption maxima exists. It is rather surprising to see that even the colorless crystals may contain much more Mn and Fe than the rose-colored ones. This fact is explained by a transition of Mn from one state of oxidation to another one. In the growth of natural tourmaline the well-known zones of rose-colored colorless and green parts may also find an explanation by variable conditions between bivalent Fe and trivalent Mn. Because of the presence of so much Fe in tourmaline they also do not show the characteristic orange-colored luminescence of trivalent Mn. The pleochroic absorption is much more intense in ultraviolet light for "colorless" crystals than for rose-colored types. The rose color is destroyed by heating the crystals to 400°, only a very faint yellowish tint remains. Nevertheless, the extinction in ultraviolet is increased, and a certain pleochroism is also preserved. The discoloring effect is explained by reduction of Mn<sup>3+</sup> to Mn<sup>2+</sup>, and oxidation of Fe<sup>2+</sup> to Fe<sup>3+</sup>. For the same reason the transparency in ultraviolet is decreased. The res. of rose-colored tourmalines are in agreement with those given in the literature.  
 W. Eitel

ASB-15A METALLURGICAL LITERATURE CLASSIFICATION

Chromium-bearing halloysite from Aldyrinsk, Southern Ural. G. S. Gritsaenko and S. V. Grum-Grzhimailo. *Zapiski Vsesoyuz. Mineral. Obshchestva* (Mineral. Zhurn.) 78, No. 1, 61-3 (1949).—Light-bluish halloysite was previously described by Vernadskii as Ni-bearing.

The authors demonstrate that  $\text{Cr}_2\text{O}_3$  (0.50-0.10%) is the coloring principle in such halloysites (2 complete analyses are given in which the relatively low water content is remarkable). The mineral consists of 77% halloysite and 23% metahalloysite. The heating curve does not show any particular effects, but those of ordinary halloysite. The Cr content influences only the color of the mineral. A spectral-analytical examn. (with the spectrophotometric eyepiece) gave an absorption curve with a marked max. at  $\lambda = 600 \text{ m}\mu$ , and a second absorption field beyond 400  $\text{m}\mu$ . The short-wave infrared absorption does not show any particularities. The presence of  $\text{Cr}^{3+}$  is also confirmed; only the bluish (not greenish as normal) tint of the mineral distinguishes it from similar halloysites. W. Rittel



GRUM-GRZHIMALO, S. V.

**Physical Properties of Synthetic Corundum.** A Symposium (Fizicheskie Svoistva Sinteticheskogo Korunda). Edited by A. V. SHUMNIKOV, M. V. KLASSEN-NEKLYUDOVA, and S. V. GRUM-GRZHIMALO. *Trudy Inst. Krist. Akad. Nauk S.S.S.R.* No. 8, 368 pp. (1953). Price R10.—The symposium was held in 1950 to give to the synthetic corundum industry a complete survey of the methods and results of scientific investigations, especially concerning optical and mechanical properties. The boule has been chiefly studied because an accurate knowledge of crystallographic orientation is the basis of every working process. The optical characteristics and structural properties of real (mosaic) crystals are therefore emphasized. The instruments used for the investigations are partly newly constructed and may be particularly recommended for studies of the physical properties of monocrystals other than those of synthetic corundum. References are given with each paper. Results of laboratory research on different properties of synthetic corundum crystals. S. V. GRUM-GRZHIMALO and M. V. KLASSEN-NEKLYUDOVA. *Ibid.*, pp. 5-12.—The influence of impurities, e.g.,  $\text{Cr}_2\text{O}_3$ ,  $\text{MgO}$ ,  $\text{SiO}_2$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{TiO}_2$ ,  $\text{V}_2\text{O}_5$ ,  $\text{CaO}$ ,  $\text{MnO}$ , and  $\text{CuO}$ , is discussed. Basic facts of the crystallography and structure of corundum crystals. E. S. RUDNITSKAYA. *Ibid.*, pp. 13-20. Thermal constants of  $\alpha\text{-Al}_2\text{O}_3$ . L. G. CHENTSOVA. *Ibid.*, pp. 21-28.—Thermochemical data are compiled. Properties of isomorphous mixes of  $\text{Al}_2\text{O}_3$  and  $\text{Cr}_2\text{O}_3$ . S. V. GRUM-GRZHIMALO. *Ibid.*, pp. 27-34.—The dimensions of the elementary cells and the fusion points of the crystalline solutions are given, together with data on densities and refractive indices, absorption spectra, and pleochroic phenomena.

Details of synthetic corundum, especially the effects of crystalline solutions with  $\text{Cr}_2\text{O}_3$ . E. N. SZAROVA and L. N. SOROKA. *Ibid.*, pp. 35-40. Short review of the electrical properties of corundum. I. M. SAVERNOVA. *Ibid.*, pp. 41-42.—Conductance as a function of temperature for white sapphire and the resistance of ceramic corundum bodies are discussed. Cr content of rubies. P. I. PASHKOVSKAYA. *Ibid.*, pp. 43-46.—Analytical data are given on the introduction of  $\text{Cr}_2\text{O}_3$  into synthetic corundum from  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$  and special effects of small additions of  $\text{CaO}$  and  $\text{MgO}$  (from sulfates) on the color of rubies are described. Cr content of the batch and of synthetic ruby. A. A. KISILEV and L. M. DOLOVA. *Ibid.*, pp. 47-50.—The losses in  $\text{Cr}_2\text{O}_3$  from the batch to the powder and the finished ruby composition are discussed. Data on spectral analysis of corundum. S. V. GRUM-GRZHIMALO. *Ibid.*, pp. 51-56.—Domestic synthetic sapphires are compared with foreign products. The Russian samples are purer, containing less Fe, Cu, and Ca; foreign synthetic corundum products often contain Ti and V, and two samples showed Na. Only Cr and Mn are higher in domestic corundum products than in the foreign material. Measurement of the refractive indices of synthetic corundum and of corundum batches. N. M. MELANKHIN. *Ibid.*, pp. 57-76.—The immersion method of I. V. Obretnov (1919) for the determination of very small changes in refractive index is described. Problems of the heating of corundum batches. E. G. VALYASHEV, A. A. KISILEV, and Y. A. LITVIN. *Ibid.*, pp. 77-88.—Special studies were made on the transition of  $\gamma\text{-Al}_2\text{O}_3$ , formed from alums, to corundum with increasing temperature and time of heat exposure.

OVER

GRUM-GRZHIMAYLO, S.V.; KLASSEN-NEKLYUDOVA, M.V.

Laboratory investigations of various properties of synthetic  
corundum crystals. Trudy inst.krist. no.8:5-12 '53. (MLRA 7:5)  
(Corundum)

GRUN-SS. RIMAYIN, S. V.

"Properties of Isomorphous Mixtures  $Al_2O_3-Cr_2O_3$ ," Tr. In-ta Kristallogr. AN SSSR.  
No 8, pp 27-34, 1953

Properties of isomorphous mixtures  $Al_2O_3-Cr_2O_3$  with various content  
of Cr are described. Some data on single-crystal ruby containing  $Cr_2O_3$   
not over 3% are given. (RzhFiz, No 6, 1955)

Sum. No. 661, 7 Oct 55

GRUM-GRZHIMAYLO, S.V.

Data on the spectrum analysis of corundum. Trudy Inst.krist.no.8:  
51-56 '53. (MLRA 7:5)

(Corundum) (Spectrum analysis)

GRUM-GRZHIMAYLO, S.V.

Description of instruments used for the investigation of corundum  
crystal coloring. Trudy Inst.krist. no.8:89-98 '53. (MLRA 7:5)  
(Corundum) (Color measurement) (Optical instruments)

GRUM-GRZHIMAYLO, S.V.; UTKINA, Ye.I.

Possibility of optical determination of chromium content in rubies.  
Trudy Inst.krist.no.8:99-110 '53. (MLRA 7:5)  
(Rubies) (Chromium oxides) (Color measurement)

VALYASHKO, Ye.G.; GRUM-GRZHIMAYLO, S.V.

Methods for the study of corundum coloring. Trudy Inst.krist.no.8:  
111-128 '53. (MLRA 7:5)

(Corundum) (Coloring matter)

GRUM-GRZHIMAYLO, S.V.; RUDNITSKAYA, Ye.S.

Pleochroism and absorption of corundum crystals in the ultraviolet  
spectral band. Trudy Inst.krist. no.8:129-138 '53. (MLRA 7:5)  
(Corundum) (Spectrum, Ultraviolet) (Absorption of light)



ANTIPOVA-KARATAYEVA, I.I.; GRUM-GRZHIMAYLO, S.V.

Possibility of using luminescence as an analysis and control of  
corundum boule components. Trudy Inst.krist.no.8:139-144 '53.  
(MLRA 7:5)

(Corundum) (Luminescence)

GRUM-GRZHIMAYLO, S.V.

Instruments for the study of optical anomalies and orientation  
in synthetic corundum. Trudy Inst.krist. no.8:165-188 '53.  
(MLRA 7:5)

(Corundum)

GRUM-GRZHIMAYLO, S.V.

The nature of coloration of rose-colored and yellow topaz from the Kamenka River (Southern Urals). Zap.Vses.min.ob-va 82 no.2:1'2-146 '53. (MLRa 6:6)  
(Kamenka Valley--Topaz)

PHASE I

TREASURE ISLAND BIBLIOGRAPHICAL REPORT

AID 468 - I

BOOK

Call No.: AF637791

Authors: MELANKHOLIN, N. M. and GRUM-GRZHMAYLO, S. V.

Full Title: METHODS OF INVESTIGATING THE OPTICAL PROPERTIES OF CRYSTALS

Transliterated Title: Metody issledovaniya opticheskikh svoystv  
kristallov

PUBLISHING DATA

Originating Agency: Academy of Sciences, USSR. Institute of  
Crystallography

Publishing House: Academy of Sciences, USSR

Date: 1954

No. pp.: 192

No. of copies: 3,500

Editorial Staff

Editor: Vedeneyeva, N. Ye., Doctor of Phys. and Math. Sci.

Others: The staff of the Institute of Crystallography of the Ac. of Sci.,  
USSR, and the staff of the crystallography laboratory previously with the  
All-Union Scientific Institute for Research in Minerals.

PURPOSE: This is a textbook dealing with optical methods for investigating crystals  
and for measuring their optical constants. It is intended mainly for workers  
in scientific research institutes and factory laboratories investigating  
crystals and all kinds of crystalline products, raw material and semi-  
products. It can also be used as a textbook for petrographic studies.

Metody issledovaniya opticheskikh svoystv kristallov

AID 468 - I

TEXT DATA

Coverage: This is the latest Soviet textbook on optical crystallography.

It covers: methods of obtaining polarized light (polarizers); the polarizing microscope; measurements of the refractive indexes of crystals (immersion and other methods); measurement of the rotating plane of polarization of light in crystals; investigation of the absorption of light by crystals (color and pleochroism of crystals); and orientation of crystals and their investigation in converging and parallel polarized light by means of special apparatuses. The methods and apparatuses outlined are those applied to transparent, colorless and slightly absorbing crystals, which can be investigated with transparent light. Thus, methods of investigation of crystals with metallic absorption which require the study of reflected light are not covered in this book.

No. of References: 22 Russian 17 (1913-1952), Foreign 5 (1914-1950)

Facilities: None

2/2

*GRUM GRZHIMAYLO*  
Category : USSR/Optics - Optical Methods of Analysis. Instruments

K-7

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5189

Author : Grum-Grzhimaylo, S.V., Klimovskaya, L.K. Vishnevskiy, V.N.

Title : Spectral Absorption Curves as a Possible Identification Feature of  
Garnet

Orig Pub : Mineralog. sb. L'vovsk. geol. s-vy, 1954, No 8, 281-294

Abstract : No abstract

Card : 1/1

GRUM-GRYZHIMAYLO, S.V.

K-5

USSR/Optics - Physical Optics.

Abs Jour : Referat Zhur - Fizika, No 3, 1957, 7700

Author : Grum - Gryzhimaylo, S.V., Anikina, L.I., Belova, Ye.N.  
Tolstikhina, K.I.

Inst : Institute of Crystallography, Institute of Geochemistry  
and Analytical Chemistry. Institute of Geological Sciences,  
Academy of Sciences, USSR.

Title : Curves of Spectral Absorption and Other Physical  
Constants of Natural Micas.

Orig Pub : Mineralog. sb. L'vovsk. geol.v-va pro un-te., 1955, No 9,  
90-119

Abstract : Curves of spectral absorption were obtained in the 220 to  
1200 m $\mu$  region for approximately 50 natural micas from  
various deposits in the USSR. -- muscovites, biotites,  
and phlogotites. Tables of the elements contained in the  
micas, and the parameters of their crystalline lattices

Card 1/3

- 30 -

USSR/Optics - Physical Optics.

K-5

Abs Jour : Referat Zhur - Fizika, No 3, 1957, 7700

A detailed table of the physical constants of the micas  
is given. It is shown that there is no definite connec-  
tion between these constants on the one hand and K, the  
transparency of the micas in the ultraviolet region and  
the amount of iron on the other hand.

Bibliography, 22 titles.

Card 3/3

- 32 -

USSR / Optics

K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10345

galvanometer. The cross sections of the absorption surfaces turn out to be close to a circle and an ovaloid, in accordance with theory.

Card : 2/2



GRECHUSHNIKOV, B.N.; GRUM-GRZHIMAYLO, S.V.

Light absorption by impurities in crystals. Trudy Inst.krist.  
no.11:179-194 '55. (MIRA 9:6)  
(Absorption of light)

GRUM-GRZHIMAYLO, S.V.; TOLSTIKHINA, K.I.; RUDNITSKAYA, Ye.S.

Research in luminescence of minerals. Zap.Vses.min.ob-va 84  
no.4:445-452 '55. (MIRA 9:2)

1. Institut kristallografii i Institut geologicheskikh nauk  
Akademii nauk SSSR, Moscow.  
(Luminescence) (Mineralogy)

GRUM-GRZHIMAILO, S. V.

The color of tourmalines; their examination in polarized ultraviolet light. S. V. Grum-Grzhimailo. *Trudy Inst. Kriol. Akad. Nauk S.S.S.R.* 1956, No. 12, 79-84; *C.A.* 42, 7667g. — The pink color is caused by  $Mn^{++}$  in coordination as  $[MnO_4]$  (concn. 0.01-0.10% Mn). For ultraviolet the rose-colored tourmaline is much more transparent than the other colored varieties of this mineral. Green, brown, and yellow tourmaline contain  $Fe^{++}$  in coordination as  $[FeO_4]$ . In the ultraviolet there is a sharp steep absorption limit and a distinct difference of absorption for  $\mu$  and  $\epsilon$ . The pleochroism is increased towards short wave lengths, while it is low in the infrared.  $Fe^{++}$  in coordination as  $[FeO_4]$  is indicated by increased absorption above 1000  $m\mu$ . The blue tourmalines are more transparent and less pleochroic in the visible short-wave range than the common tourmalines. In ultraviolet, however, there is a strong absorption below 400  $m\mu$ . The color pigment of the blue tourmalines is  $Fe^{++}$  and  $Fe^{+++}$ . The visible absorption max. at 700  $m\mu$  is particularly strong. Entirely "colorless" tourmalines show a strong ultraviolet absorption,  $\mu > \epsilon$ ; evidently their Fe content is higher than that of rose-colored tourmaline (similar phenomena are observed in colorless and pink micas). Micrographs in polarized ultraviolet light illustrate the high sensitivity of this method for the distinction of tourmalines of different compns., zonal structures, etc., which are not easily detected by the ordinary light microscope. The intensity ratios in visible and in ultraviolet light may even be reversed (e.g. for rose-colored and "colorless" zones in tourmaline). W. Bittel.

*G. RUM-GRZHMAYLO, S.V.*  
USSR/Physical Chemistry - Crystals.

B-5

Abs Jour : Referat Zhur - Khimiya, No 1, 1958, 23<sup>4</sup>

Author : S.V. Grum-Grzhimaylo, L.A. Pevneva.

Inst : Institute of Crystallography of Academy of Sciences of USSR.

Title : Curves of Spectral Absorption of Beryls and Topazes of Various Color.

Orig Pub : Tr. In-ta kristallogr. AN SSSR, 1956, vyp. 12, 85-92

Abstract : The absorption spectra of Ural beryls and Volynian topazes were studied in the range from 250 to 1100 m $\mu$  in polarized light. All the varieties of beryls produce an infrared absorption band in the region from 810 to 840 m $\mu$ , the intensity of which is considerably greater in case of an ordinary ray. This band is attributed to Fe<sup>2+</sup> ions. The green beryl (emerald) produces, besides the infrared band,

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USSR/Physical Chemistry - Crystals.

B-5

Abs Jour : Ref Zhur - Khimiya, No 1, 1958, 234

also two visible bands at 430 to 440 and 640 to 660 m $\mu$ , attributed to Cr<sup>3+</sup> ions, and the blue beryls (aquamarines) produce a weak band at 370 m $\mu$  attributed to Fe<sup>2+</sup>. The variation of the beryl coloration is caused by different absorption in the visible spectrum region. The blue coloration of topazes with bands at 660 and 430 m $\mu$  is attributed to Cr<sup>3+</sup> ions. The rose coloration of topazes from the Kamenka River with bands at 400 and 540 m $\mu$  is attributed to Cr<sup>3+</sup> ions. The difference in the situation of absorption bands of Fe<sup>2+</sup> and Cr<sup>3+</sup> ions of beryls and topazes is attributed to different polarization of these ions in crystals of different structure.

Card 2/2

GRUM-GRZ-544-0

PRIKHOT'KO, A F

24(7)

13

PHASE I BOOK EXPLOITATION SOV/1365

L'vov. Universitet

Materialy I Vsesoyuznogo soveshchaniya po spektroskopii. t. 1: Molekulyarnaya spektroskopiya (Papers of the 10th All-Union Conference on Spectroscopy. Vol. 1: Molecular Spectroscopy) [L'vov] Izd-vo L'vovskogo universiteta, 1957. 499 p. 4,000 copies printed. (Series: Its: Fizichnyy sbirnyk, vyp. 3/8/)

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii. Ed.: Dzer, S.L.; Tech. Ed.: Saranyuk, T.V.; Editorial Board: Lavistser, G.S., Academician (Resp. Ed., Deceased), Neporent, B.S., Doctor of Physical and Mathematical Sciences, Fabelinskiy, I.L., Doctor of Physical and Mathematical Sciences, Fabrikant, V.A., Doctor of Physical and Mathematical Sciences, Koritavskiy, V.G., Candidate of Technical Sciences, Rayskiy, S.M., Candidate of Physical and Mathematical Sciences, Klimovskiy, L.K., Candidate of Physical and Mathematical Sciences, Miliyanchuk, V.S., Candidate of Physical and Mathematical Sciences, and Glauberman, A. Ye., Candidate of Physical and Mathematical Sciences.

Card 1/30

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|--|-----|
| Deygen, M.F. Theory of Light Absorption by Impurity Centers in Homeopolar Crystals   | 135 |
| Deygen, M.F., and V.L. Vinetskiy. Optical Properties of $F_2^+$ -centers in Ionic Crystals   | 137 |
| Rashba, E.I. Impurity Absorption in Molecular Crystals   | 140 |
| Kats, M.L. Absorption Spectra of Some Solid Solutions and Their Change When Subjected to Hard Radiation  | 141 |
| Grum-Grzhimaylo, S.V., B.M. Grechushnikov, and R.A. Kravchenko-Berezhiy. Vibrational Structure in the Absorption Spectra of Corundum Tinted With Vanadium (at 100°K) | 144 |
| Slavnova, Ye. N. Spectrophotometric Study of Dye Impurities in Crystals of Lead and Barium Nitrites  | 146 |

Card 10/30

*Grum-Grzhimaylo, S.V.*

B-5

USSR/Physical Chemistry - Crystals.

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3670.

Author : S.V. ~~Grum-Grzhimaylo~~, M.G. Yenikeeva.

Inst :

Title : Absorption Spectrum Vibration "Structure" of Crystals, Coloration of Which is Caused by Isomorphous Admixtures.

Orig Pub: Kristallografiya, 1957, 2, No 1, 186-189.

Abstract: The studies (RZhKhim, 1956, 31784) of vibration structure of wide admixture absorption bands of crystals in polarized light were continued. At 100°K, structure maxima are observed in spectra of corundum containing up to about 2% of  $\text{Cr}_2\text{O}_3$  only in the ordinary wave, and their position does not depend on the  $\text{Cr}_2\text{O}_3$  concentration. No structure was revealed in spectra of corundum with isomorphous admixtures of Ni, Mn and Ti. Two wide bell-shaped absorption bands coinciding with Gauss's error curve are observed in kyanite spectrum in case of light vibrat-

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Card : 1/2

... vibrating along n, these maxima belong possibly to the vibration structure. But there are narrow but not equidistant maxima in the blue spectrum range. The authors arrive to the conclusion that the results obtained with corundum with  $\text{Cr}_2\text{O}_3$  admixture confirm the theory of admixture absorption (1957, 31784). The structure absence in spectra of a series of minerals is attributed to the low admixture concentration.

APPROVED FOR RELEASE: 08/10/2001

CIA-RDP86-00513R000617120003-1

Card : 2/2

-23-

AUTHORS: Grum-Grzhimaylo, S.V. and Plyusnina, L.I. 70-3-2-7/26  
 TITLE: ~~On the Absorption Spectra of Cobalt Compounds~~  
 (O spektrakh pogloshcheniya kobal'tovykh soedineniy)  
 PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 2, pp 175 - 181  
 (USSR).

ABSTRACT: The absorption spectra of the following compounds  
 were measured:

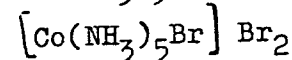
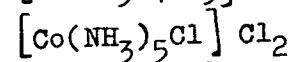
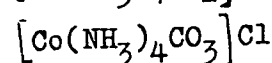
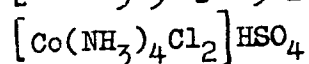
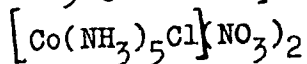
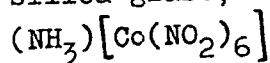
Co(SCN)<sub>2</sub>.6H<sub>2</sub>O solution in water (1.2g/ 100 ml water)  
 CoSO<sub>4</sub>.7H<sub>2</sub>O ..... (2.2g/ 100 ml water)  
 CoCl<sub>2</sub>.6H<sub>2</sub>O ..... (1.08g/ 100 ml water)  
 crystal plates of CoCl<sub>2</sub>.6H<sub>2</sub>O with the electric vector along  
 n'<sub>g</sub> and n'<sub>m</sub> powdered crystals of CoCl<sub>2</sub>.6H<sub>2</sub>O  
 powdered crystals of CoCl<sub>2</sub>  
 powdered crystals of CoCl<sub>2</sub>.2H<sub>2</sub>O  
 crystals, after long keeping in air, of CoCl<sub>2</sub>.6H<sub>2</sub>O  
 ..... CoCl<sub>2</sub>.2H<sub>2</sub>O  
 Card1/3 ..... CoCl<sub>2</sub>



70-3-2-7/26

On the Absorption Spectra of Cobalt Compounds

powdered crystals of  $\text{Cs}_2\text{CoCl}_4$   
 .....  $\text{Cs}_2\text{CoBr}_4$   
 silica glass, coloured with cobalt



These compounds contained  $\text{Co}^{2+}$  four- and six-co-ordinated  
 and  $\text{Co}^{3+}$  six-co-ordinated ions. Common features in the  
 absorption curves due to these cations are identified.  
 Measurements were made between 3 000 and 11 000 Å.

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On the Absorption Spectra of Cobalt Compounds

70-3-2-7/26

There are 3 figures, 1 table and 19 references, 13 of which are Soviet, 4 English and 2 German.

ASSOCIATION: Institut kristallografi AN SSSR  
(Institute of Crystallography, Ac.Sc. USSR)

SUBMITTED: May 9, 1957

Card 3/3

107/120-58-5-21/32

AUTHORS: ~~Grun-Grazhimaylo~~, S. V., Bondarenko, K. P., Klimasheva, G. V.  
TITLE: An Attachment to the SF-4 for Studying Absorption in Crystals  
(Prisposobleniya k SF-4 dlya issledovaniya pogloshcheniya  
kristallov)

PERIODICAL: Priory i tekhnika eksperimenta, 1958, Nr 5, pp 83-86  
(USSR)

ABSTRACT: A description is given of an attachment to the SF-4 quartz photoelectric spectrophotometer which may be used to measure the absorption of polarised light in crystals in the temperature interval -170 to 500°C, as well as the absorption of crystalline powders on reflection. A photograph of the attachment is shown in Fig.1. A schematic drawing of the attachment is shown in Fig.2. It consists of a cylindrical box, 5, which contains a hole which lets in the beam of light from the instrument. The box contains a front coated aluminium mirror, 6, 70 mm in diameter. Below this mirror there is a plane mirror, 8, (7 x 15 mm<sup>2</sup>). This is kept in position by means of the clamp, 9, 10, and directs the beam of light onto the specimen which is placed in the ebonite cap, 11, whose diameter is 12 mm. This cap may be rotated in the horizontal plane by means of the handle 13. The same handle controls Card 1/2 another cap which contains a standard substance which can be

SOV/120-58-5-21/32

An Attachment to the SF-4 for Studying Absorption in Crystals

turned into the light beam when necessary. By means of the handle 13 the specimen and the standard are in turn placed under the mirror, 8. The light which is scattered by the powder in 11 is intercepted by the spherical mirror, 6, which directs it onto the photocell immediately below (Fig.2). 200 mg of the material are required in each experiment. In order to measure absorption of polarised light in crystals the system is modified to include a polarising prism. Provision is made for carrying out experiments at high and low temperatures. There are 3 figures and 4 references, of which 3 are Soviet and 1 is English.

ASSOCIATION: Institut Kristallografii AN SSSR (Institute of Crystallography of the Academy of Sciences of the USSR)

SUBMITTED: October 9, 1957.

1-22 2/2

GRUM-GRZHIMAYLOV, S.V.; KOZHINA, K.T.

Chlorides from crystal-bearing veins in the Polar Ural region  
Min.sbor. no.12:351-362 '58. (MIRA 13:2)

1. Institut kristallografii AN SSSR, Moskva i Institut geologii  
rudnykh mestorozhdeniy, petrografii, mineralogii i geokhimi  
AN SSSR, Moskva.

(Ural Mountains--Chlorides)

GRUM-GRZHYMAYLO, S.V.

Coloration of precious and semiprecious stones. Zap. Vses.  
min. ob-va 87 no.2:129-150 '58. (MIRA 11:9)

1. Institut kristallografii AN SSSR, Moskva. Deystvitel'nyy  
chlen Vsesoyuznogo mineralogicheskogo obshchestva.  
(Precious stones)

AUTHOR: Grum-Grzhimaylo, S.V.

SOV/70-4-3-28/32

TITLE: Adaptations of a Defectoscope for the Investigation of Optical Anomalies in Crystals and the Determination of the Orientation of Watch Jewels

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 3, pp 431-433 (USSR)

ABSTRACT: A defectoscope is normally used for examining crystal plates conoscopically. A tilting Arshinov stage was adapted. It consisted of a plate of clear glass set diametrically over a matt glass hemisphere. The specimen rests on this clear glass and is covered by a glass hemisphere, which is available in three different sizes, set in a small divided circle and which can be translated parallel to its flat surface. The optic axial angle of a crystal plate can be measured and anomalies detected, their directions being related to those of faces or cracks in the crystal. With a 5X magnifier it is convenient to use a 2 mm diameter conoscope sphere. The main advantage of the defectoscope is that the crystal and its interference pattern can be seen simultaneously. For seeing optical anomalies in still smaller regions of a crystal (than 2 mm)

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Adaptations of a Defectoscope for the Investigation of Optical  
Anomalies in Crystals and the Determination of the Orientation of  
Watch Jewels

diameter), small glass spheres fixed to a cellophane film can be superimposed on the crystal. Here, the defectoscope's magnifier can be advantageously replaced by Arshinov's telemagnifier, consisting of an ocular from an 8X pair of binoculars and a 5.5X objective from a Fedorov stage. A grid is put in the field of the eyepiece and, after calibration with crystals of known 2E, can be used for the determination of optic axial angles. A mechanical device for holding glass balls (diameter 0.5 mm) over watch jewels for checking their orientation on a production basis is described. Jewels are held in a kind of magazine. There are 2 figures and 5 Soviet references.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of  
Crystallography of the Ac.Sc., USSR)

SUBMITTED: July 12, 1958

Card 2/2



24.7100

75996  
SOV/70-4-5-18/36

AUTHORS: Gasanov, B. G., Grum-Grzhimaylo, S. V.

TITLE: Absorption Spectra of the Crystals and Solutions of the Complex Compounds of Fe, Ni, and Cu, with Mono-, Di- and Triethanolamine

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 5, pp 732-741 (USSR)

ABSTRACT: The protection of ferrous metals from corrosion by the films of monoethanolamine or of its derivatives, their negative effect on nonferrous metals, the preceeding attempts to disclose the mechanism leading to one or another effect, and determination of the compounds formed by ethanolamines with various metals, are cited. The authors studied absorption spectra of the colored crystals and solutions of the compounds listed in the title. The purpose was to determine the valence and coordination of the complexions, to clarify the effect of ethanolamines on the absorption spectra and color of the complex compounds,

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Absorption Spectra of the Crystals and  
Solutions of the Complex Compounds of Fe,  
Ni, and Cu, with Mono-, Di-, and Triethanolamine

75996

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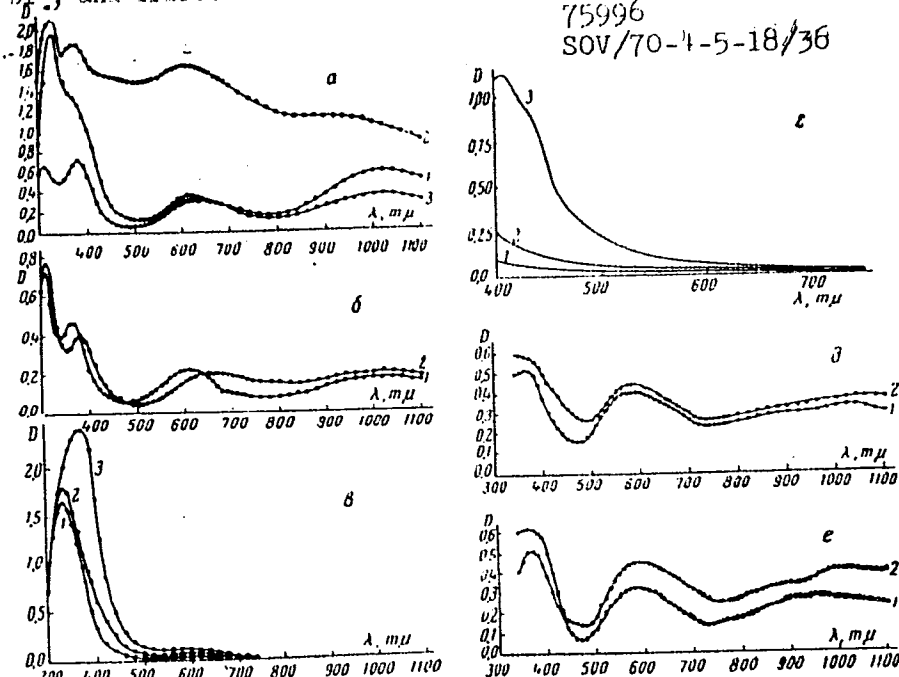
produced under various conditions. The absorption curves for solutions and crystalline powders of the ethanolamine compounds with Ni are shown in Fig. 2. The one year old crystals of  $\left[ \text{Cu}(\text{H}_2\text{NCH}_2\text{CH}_2\text{OH})_4 \right] \text{SO}_4 \cdot 4\text{H}_2\text{O}$ , washed in water, had greenish-blue color, cleavages in 3 directions, extinctions from 0 to 30°, blue to green pleochroism, refraction indices  $n_\gamma = 1.574$  and  $n_\alpha = 1.560$ . The  $\left[ \text{Cu}(\text{H}_2\text{NCH}_2\text{CH}_2\text{OH})_3 \right] \text{SO}_4$  crystals, washed in alcohol, had blue color, and the same cleavages, extinctions, and pleochroism, as the former crystals, but lower hardness and refraction indices  $n_\gamma = 1.571$  and  $n_\alpha = 1.552$ . The  $\left[ \text{Cu}(\text{H}_2\text{NCH}_2\text{CH}_2\text{OH})_4 \right] (\text{NO}_3)_2 \cdot \text{H}_2\text{O}$  crystals were dark blue, prismatic, with positive elongation and cleavages in 3 directions, violet to blue pleochroism, extinctions from 30° to 70°,  $n_\gamma = 1.586$  and  $n_\alpha = 1.581$ . The  $\left[ \text{Cu}(\text{H}_2\text{NCH}_2\text{CH}_2\text{OH})_3 \right] (\text{NO}_3)_2$  crystals had about the same properties. Similarly, the properties of the complex compounds with Ni and Fe were

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Absorption Spectra of the Crystals and Solutions of the Complex Compounds of Fe, Ni, and Cu, with Mono-, Di-, and Triethanolamine

75996  
SOV/70-4-5-18/36

Fig. 2.  
Curves for  
aqueous solutions  
(a, b, g, 2)  
Curves for crystals  
(d, e)



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Absorption Spectra of the Crystals and  
Solutions of the Complex Compounds of Fe,  
Ni, and Cu, with Mono-, Di-, and Triethanolamine

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SOV/70-4-5-18/36

established. They differ considerably from the former, including the crystal habits. The compounds with Fe proved to be unstable except in alcohol. The reactions with pure Ni and Cu produce the same compounds, which result from reactions with the salts of the respective metals. The maximum absorption shifts toward longer waves when monoethanolamine is substituted by di- and triethanolamines, while substitution of  $\text{SO}_4$  by  $\text{NO}_3$  hardly affects the absorption. There are 3 figures; 2 tables; and 19 references, 13 Soviet, 2 French, 1 U.S., 1 German, 1 Finnish, 1 Indian. The U.S. reference is: M. Bolling, L. Hall, J. Amer. Chem. Soc., 75, 16, 3953 (1953).

ASSOCIATION: Moscow State Pedagogical Institute imeni V. I. Lenin  
and Crystallographical Institute of the Academy of  
Sciences of the USSR (Moskovskiy gosudarstvennyy  
pedagogicheskiy institut imeni V. I. Lenina i  
Institut Kristallografiy AN SSSR)

SUBMITTED: May 29, 1959  
Card 4/4

SOV/51-6-2-20/39

AUTHORS: Grum-Grzhimaylo, S.V., Brilliantov, N.A. and Sviridova, R.K.

TITLE: The Absorption Spectra of Vanadium-Coloured Corundum at Low Temperatures (Down to 1.7°K). ((Spektry pogloshcheniya korunda, okrashennogo vanadiyem, pri nizkikh temperaturakh (do 1.7°K) ))

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 2, pp 238-239 (USSR)

ABSTRACT: The authors obtained the absorption spectra of plane-parallel plates, cut parallel to the optical axis, of vanadium-coloured corundum crystals. The plates were of 28 mm thickness. Measurements were made at low temperatures down to 1.7°K. The records obtained (e.g. Fig a on p 239) show clearly that the absorption spectrum consists of a series of vibrational bands, separated by approximately equal distances from one another. The observed structure agrees fully with Krivoglaz and Pekar's theory (Ref 2). The vibrational structure becomes clearer at 1.7°K, compared with the structure obtained by Grum-Grzhimaylo et al. (Ref 1) at 100°K. The number of bands, in the direction of short wavelengths starting from the narrowest vibrational band, increases from 5-6 to 8-9 on the lowering of the temperature from 100° to 1.7°K. Figs 6 and 8 show bands at 293°K in the blue region, obtained using the

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The Absorption Spectra of Vanadium-Coloured Corundum at Low Temperatures (Down to 1.7°K

ordinary and the extraordinary waves respectively. Fig 2 shows the bands at the violet end obtained at 1.7°K. Fig 3 shows the ordinary (I) and the extraordinary (II) bands at 1.7, 4.2, 77 and 290° (the temperature increases going down in this figure). Fig 4 is a record of the 4756 and 4757 Å band profiles. In all figures III represents the iron spectrum used for calibration. Acknowledgments are made to A.I. Shal'nikov for his advice. There are 6 figures and 3 Soviet references.

SUBMITTED: June 14, 1958

Card 2/2

SOV/51-6-2-21/39

AUTHORS: ~~Grun-Grazhmaylo, S.V.~~, Brilliantov, N.A., Sviridova, R.K. and  
Dzhamalova, A.S.

TITLE: The Absorption Spectra of Rubies at Low Temperatures (Down to 1.7°K)  
(O Spektrakh pogloshcheniya rubinov pri nizkikh temperaturakh [do 1.7°K])

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 2, pp 240-242 (USSR)

ABSTRACT: The authors used an ISP-61 glass spectrograph to study the absorption spectra of rubies at the temperatures of liquid nitrogen, hydrogen and helium. Measurements were made in polarized light: the spectra were obtained both for the ordinary and extraordinary waves. Samples were in the form of plane-parallel plates of 0.4-2.3 mm thickness, cut parallel to the optical axis of rubies. Colour of rubies is due to two absorption bands (Figs a and b on p 241): one in the visible region and the other at the boundary between the visible and the ultraviolet regions. Figs a and b represent the spectra obtained using the ordinary and the extraordinary waves respectively. For a sample number 88 with 1.24% of Cr<sub>2</sub>O<sub>3</sub> a narrow vibrational band in the ordinary light was observed at 5967 Å, and at 5960 Å in the extraordinary light (Figs a, b and g, obtained at 1.7°K). In the violet region two intense, strongly

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The Absorption Spectra of Rubies at Low Temperatures (Down to 1.7°K)

polarized absorption lines were observed at 4761 and 4746 Å (Figs a, b and v obtained at 1.7°K). The results obtained agree well with Krivoлаз and Pekar's theory (Ref 6). The authors used rubies containing various amounts of chromium. They found that on increase of the amount of Cr the positions of the absorption bands remained the same but the number of observed bands decreased. Acknowledgments are made to A.I. Shal'nikov for his advice. There are 4 figures and 8 references, 6 of which are Soviet, 1 German and 1 Indian.

SUBMITTED: June 14, 1959

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GRUM-GRZHIMAYLO, S.V.; KLIMUSHEVA, G.V.

Temperature dependence of the wide absorption bands in the spectra of  
crystals of different structures, colored by isomorphic impurities.

Opt. i spektr. 8 no.3:342-351 Mr '60.

(MIRA 14:5)

(Crystals--Spectra)

GORCHAPENKO, A.M.; GRUM-GREZHINAYLO, S.V.; FEDOROV, F.I.

Light absorption surfaces of crystals of various systems.  
Kristallografiia 9 no.4:589-598 J1-Ag '64.

(MIRA 17:11)

1. Institut fiziki AN BSSR i Institut kristallografii AN ESSR.

L 25253-65 EWT(m)/EWP(t)/EWP(b) Pad IJP(c) JD/HW/JG

ACCESSION NR: AP5004339

S/0070/65/010/001/0059/0062

AUTHOR: Yemel'yanova, Ye. N.; Grun-Grzhimaylo, S. V.; Boksha, O. N.; Varina, T. M.

TITLE: Synthetic beryllium containing V, Mn, Co, and Ni

36  
B

SOURCE: Kristallografiya, v. 10, no. 1, 1965, 59-62

TOPIC TAGS: hydrothermal synthesis, absorption spectrum, isomorphous crystal, alkali solution

ABSTRACT: Beryllium single crystals with admixtures of V, Mn, Cd and Ni in boron compounds ( $H_2BO_3$  and  $H_2B_4O_7$ ) were synthesized by the hydrothermal method. The absorption spectra of the obtained crystals were studied at room as well as low temperatures in order to determine which of the admixtures in the crystal are isomorphous, and what is their valency. It was found that in boric acid solutions it is totally dissolved and crystallized in the form of other alumsilicates such as cancrinite, nepheline, and albite. Orig. art. has: 2 figures.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography, AN SSSR); Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

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